

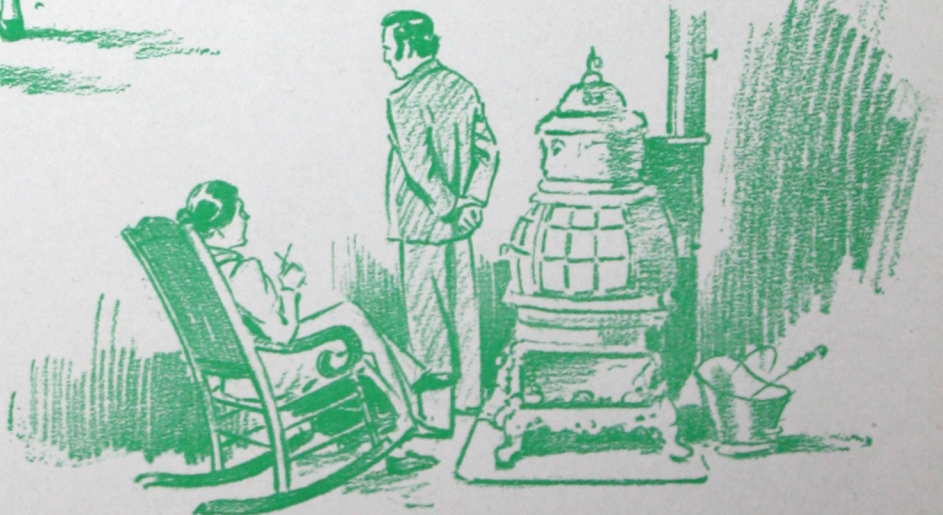
Heating and AIR CONDITIONING **THE POSTWAR HOME**





*"To make a happy fireside clime
to weans and wife
That is the true pathos and
Sublime of human life"*

— BURNS

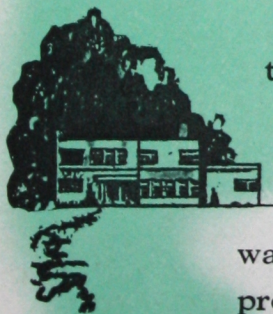


WE ARE VERY HAPPY TO MAKE THIS LITTLE BOOKLET AVAILABLE TO YOU . . . You will find it interesting to read, informative and challenging, because we are going to talk to you straight from the shoulder — and pull no punches. It is in your interest, for your home comfort and your pocket-book.



¶ Only in that way can this book give you what we believe you should know about your present heating system, and what you should demand be incorporated in the plans for your new post-war home.

¶ Minneapolis-Honeywell has been in business 58 years, and outside of the war years has devoted all its talents to creating heating comfort for the American homemaker. Modestly, we believe we have made many substantial contributions — but not enough — not good enough. We are not satisfied, and suspect you are not. Therefore, today, as never before we are working and planning for better heating in your post-war home . . . this we promise you, just as you



have been promised and will expect other new and better things in the days following peace.

¶ Were we to ask you if your present heating system is O. K., we would probably get answers that would indicate, generally speaking, satisfaction. Such a tabulation might well cause us to sit back on our haunches, bathe ourselves in self-admiration, fall into complacency, and eventually die of dry rot. But, we are not going to do that, because we are not satisfied, and that's the way it should be.



¶ We hinted that your answer to the query, "Are you satisfied with your present heating system," might be — "Yes," but we dare not be so presumptuous, and so we are going to let you answer the following questions in your own mind. If you wish to check them with your own pencil, that's all right, too, for after all, it is only your score that counts.



CHECK THEM WITH YOUR OWN PENCIL

Check ☐ Yes ☐ or ☐ No

- 1 Do you think your fuel bill is too high? ☐ ☐
- 2 Have you roasted in the living room, in order to maintain a livable temperature in the rest of house? ☐ ☐
- 3 Have you found your kitchen too hot when cooking or washing dishes? ☐ ☐
- 4 Is your bathroom (particularly when you take a hot bath) too cold for comfort? ☐ ☐
- 5 Are your ceilings hotter than the rest of the room . . . Walls cold? ☐ ☐
- 6 Are your floors cold, drafty, too cold for the children to play on? ☐ ☐
- 7 Does your furnace or boiler supply heat when your thermostat demands it and then during the "off period" does your house feel chilly before the heat comes on again? ☐ ☐
- 8 Do your radiators run steaming hot, then cool off and because of that a chill sets in, or do your registers send up hot blasts and then cool down, until finally little or no warm air comes through them? ☐ ☐
- 9 Do you see the folly of trying to heat a house, big or little, from one little thermostat stuck on the wall in one room? ☐ ☐

- 10 Is the sunny side of your house warmer than the other sides, and is the windward side always colder? ☐ ☐
- 11 Wouldn't you like to maintain different temperatures in various rooms of the house? ☐ ☐

For example:

- A The living room warm during the day while the bedrooms remain cooler? ☐ ☐
- B The bedrooms warmer on retiring, and cooler while sleeping? ☐ ☐
- C The bathroom warm enough to take a shower? ☐ ☐
- D The sick room warmer than the other bedrooms? ☐ ☐
- E The nursery warmer than the rest of the house? ☐ ☐
- F The kitchen cool and comfortable when cooking? ☐ ☐
- G The laundry cool and comfortable when washing and ironing? ☐ ☐
- H The recreation room cool enough for billiards, table tennis, or a game of darts? ☐ ☐
- I The garage just warm enough to start your motor with ease on a zero morning? ☐ ☐

- 12 Don't you want the economy that comes from a controlled variation of temperature in different parts of the house? ☐ ☐

- 13 Don't you want to save the fuel now going to heat an unoccupied bedroom, or to make it available for the living room, or vice versa? . . . ☐ ☐

Now add your score. We believe your answers to these questions are "YES."

But, here is another set of questions which you need not score. Their answers speak for themselves.

- 1 Isn't it true that we have been sold short on our heating systems? By that we mean, too little attention has been given to the heating system by all of us? . . . ☐ ☐



- 2 Isn't it true that we have been sold fancy kitchens, glamour bathrooms, artificial fireplaces, recreation rooms, and a host of other things, with little or no mention made of our heating system? ☐ ☐



- 3 Isn't it often true that after all other plans were made, only the money that was left went into the heating system? ☐ ☐

- 4 Isn't it often true that with an inadequate appropriation, bids were taken for your heating system and the lowest bidder took the job, and, through no fault of his own, had to give you something less than you should have had? ☐ ☐

- 5 Isn't it true that the heating system is such an integral part of the construction of your house that it is very difficult to change? ☐ ☐

Yes

We believe that your answers to these questions, too, are "Yes." But . . . now if we ask whether you are satisfied with your present heating system, we believe your answer will be "NO."

¶ Of all the questions we have asked, the "\$64.00" one is your question to us. "How do we correct these faults — gain these advantages?" In terms of your comfort and pocket-book, our reply would be, "In the new developments of Minneapolis-Honeywell."

¶ What we are going to describe in the following pages is not in the dream stage, not in the research laboratories, not on the drawing boards, but will be ready when you modernize or build your new home. They are proved, tried, and tested. They will do what we say they will do. But, before we go into that, let's digress for just a moment and think about this thing we call a heating system.

No

We believe the answers to these questions are "NO" and that all these answers put us in common agreement—common understanding. So let's proceed from here to explain and illustrate as simply as we can, for it is not likely that you are an expert, how the things we propose to offer will give you more comfort, more economy—better home heating. How they work, what they look like, and an idea of what they cost, where they can be put, how they can be adapted to your present home, or be incorporated in the plans of your postwar home, are the things, after all is said and done, that you want to know.

1 Have you, and that means all of us, valued enough the one thing, outside of the four bare walls and the roof, that is the most important item in the construction of the whole house — your heating system? ☐ ☐

2 Is there anything, outside of food and shelter, that is more important to our well-being than warmth, in terms of bodily comfort, and just the right amount according to our own personal needs? ☐ ☐

3 In terms of colds and chills that may lead to more serious illness, is there anything that means more to the health of a household? ☐ ☐

4 Is there anything that gives as much charm and livability to a household as a fine, accurately controlled heating system? ☐ ☐

¶ And that brings us to the announcement of a unique method for uniform heat distribution, which may well revolutionize all postwar home heating.



MODUFLOW

A REVOLUTIONARY DEVELOPMENT IN HEATING

MODUFLOW . . . a brand new, powerful word in home heating. You will hear it time and time again in the future.

¶ Reduced to the parts from which it was coined it stands for "modulated flow." But what is modulated flow? The dictionary says "Modulate — to measure or meter, to adjust, or regulate by a certain proportion, etc.". Therefore, MODUFLOW means . . . modulated heat with continuous flow of the heat medium (air, water, steam).

¶ Obviously it is the direct opposite of the "on and off" or intermittent heat supply that prevails today, which we predict will be obsolete in the better homes of tomorrow. With MODUFLOW, heating ups and downs will vanish. There will be an even flow of just the right amount of heat, constant and continuous, to replace the heat loss in your home, which occurs every second of the day. Sometimes we lose sight of the fact that the heat required for bodily comfort in a room or a home must be only sufficient to offset the heat which is lost through doors, windows, walls, and 101 different places,

and that this loss is constant. Therefore, heat replacement should be constant, except of course when outside temperatures make heating unnecessary. MODUFLOW does just that, and saves you fuel besides.

¶ The MODUFLOW SYSTEM of control developed by Minneapolis-Honeywell is not a new development, nor is it in any sense an untried experiment. The method of heat modulation and continuous flow, has been applied over a period of years to large structures, such as public and commercial buildings, school and industrial plants. The M-H engineers responsible for this development have now adapted it for the house, so that it will be available in the postwar period to every home maker at moderate cost.

¶ In thinking of the MODUFLOW SYSTEM as applied to your house, it should be pointed out that the system divides itself into two classifications — one a simple application for existing homes, as well as new ones—the other for new homes where provision can be made during construction for certain additional features and refinements.

CONVENTIONAL HOT WATER SYSTEM

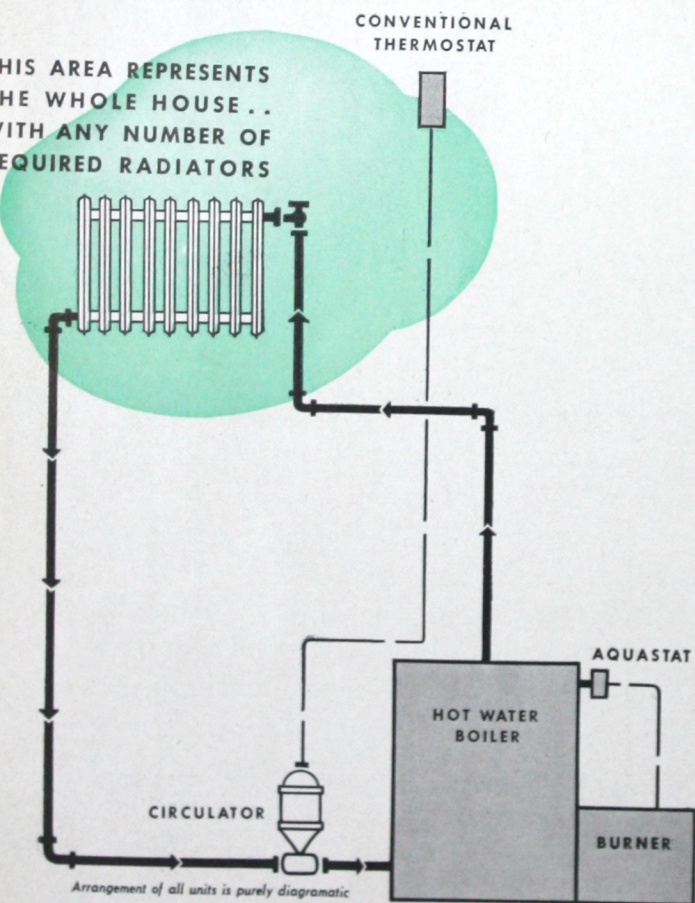
In the following pages we are going to describe three types of heating systems in general use today—hot water—warm air—steam. Each is written under its own caption, so that you may read, if you choose, only the system which interests you most.

¶ First we are going to talk about a conventional hot water system. If it is a modern hot water system, it is probably made up of these essential elements—(1) boiler—(2) burner (coal, gas

or oil) — (3) circulator — (4) Aquastat (boiler temperature control) — and a (5) conventional thermostat—(see diagram below).

¶ Its operation is briefly this:— The Aquastat controls the burner, and maintains the water at a predetermined temperature, usually about 180° F. When the water gets cooler, the Aquastat sends an electrical message to the burner and it starts up, and when the water in the boiler has again reached its 180°, the Aquastat shuts off the burner. When the room thermostat demands heat, to satisfy its setting, it sends an electric message to the circulator—“to go on”—and it immediately starts to pump 180° water into the radiators. When the thermostat is satisfied, it sends another electric message to the circulator to—“shut off”—and it immediately stops, thus shutting off all circulation through the system. This results in a steady decline of radiator temperatures, and the rooms get gradually colder.

¶ This is known as the “off and on,” intermittent type of heat distribution. In this kind of a system the circulator is either delivering very hot or no water, which anyone can see is a fault in itself. It also produces what heating men call a “lag” and an “over shoot,” a condition they have tried to correct for years. MODUFLOW will correct this.

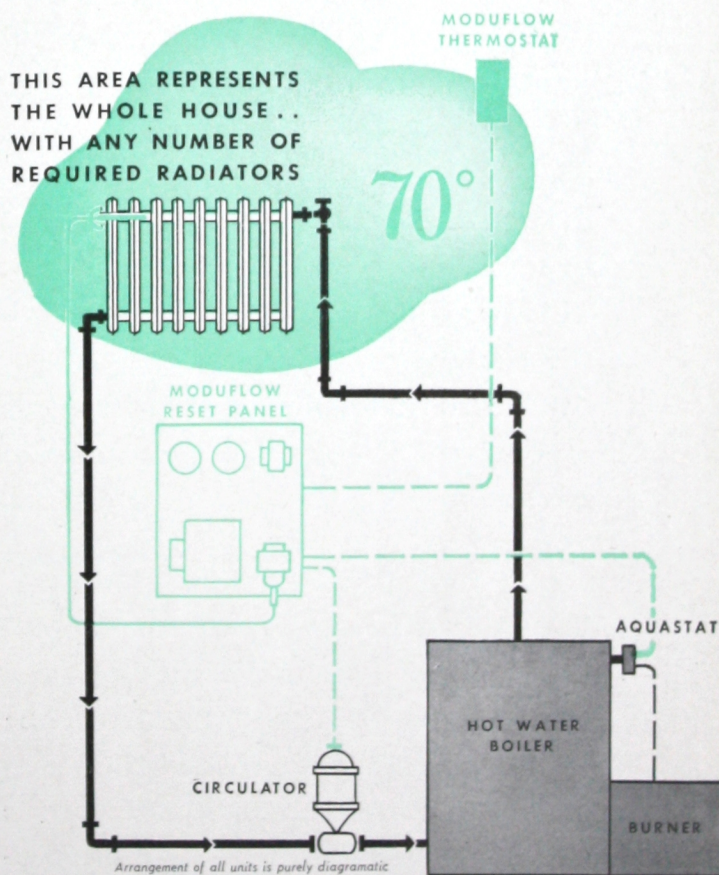



¶ How can MODUFLOW be applied to your hot water heating system with moderate expense? The diagram below shows one method for adding MODUFLOW to your heating system. The green lines are the simple additions, and all we did was to replace the conventional thermostat with a Moduflow Thermostat, added a Reset Panel and a temperature sensitive bulb, located in the radiator in the same room as the thermostat. Now, let's see how it works, and follow the diagram.

¶ The thermostat measures the rate of heat loss in the room, which is continuous, and sends an electrical message to the Reset Panel. The bulb in the radiator is sensitive to the water temperatures, and it, too, sends a message to the Reset Panel. Upon receipt of the two messages, the panel immediately establishes the amount of heat which is to be delivered to the home for comfort. Comfort is of course predetermined by the occupants, through their original setting of the thermostat. In other words, the Reset Panel is the "mastermind" that controls the burner, the circulator, and the temperature of the water to be delivered to the radiators to create the comfort desired. More simply stated, the Moduflow Reset method will deliver water to the radiators at varying temperatures, ranging from very hot to barely warm, and most important,

the radiators are never cold. That's what you want, and that's the idea that will produce the right temperature at the right place, and at the right time. On the other hand, if there is no demand for heat, or in mild weather when the outside temperatures approach the thermostat setting, a switch in the Reset Panel shuts off the burner and the circulator, and the whole system is dormant. Night shut-down can also be incorporated as an added economy feature.

The illustration below shows only one method for installing Moduflow. There are others.





MODUFLOW SECTIONAL

CONTROL SYSTEM FOR HOT WATER

Let's assume that you have plans already made for your new postwar home, but, they do not include the MODUFLOW SYSTEM. Show this diagram to your Architect or heating contractor, and if he wants additional information, tell him to write us. We'll answer "pronto."

¶ We are now going to discuss a SECTIONAL MODUFLOW HOT WATER HEATING SYSTEM. First, you will want to know what we mean by sectional. It is a method of distributing heat to the various parts of the house in such a way that each part is warmed in accordance with its individual needs. This you will recognize is in contrast to the current practice of trying to heat the entire house with one thermostat, on one wall of one room, at a uniform setting.

¶ Sectional heating is standard practice in all modern public buildings and has been so successful that it can be applied to homes at a cost within reach of everyone. The first step is to divide the house in two, three, or more sec-

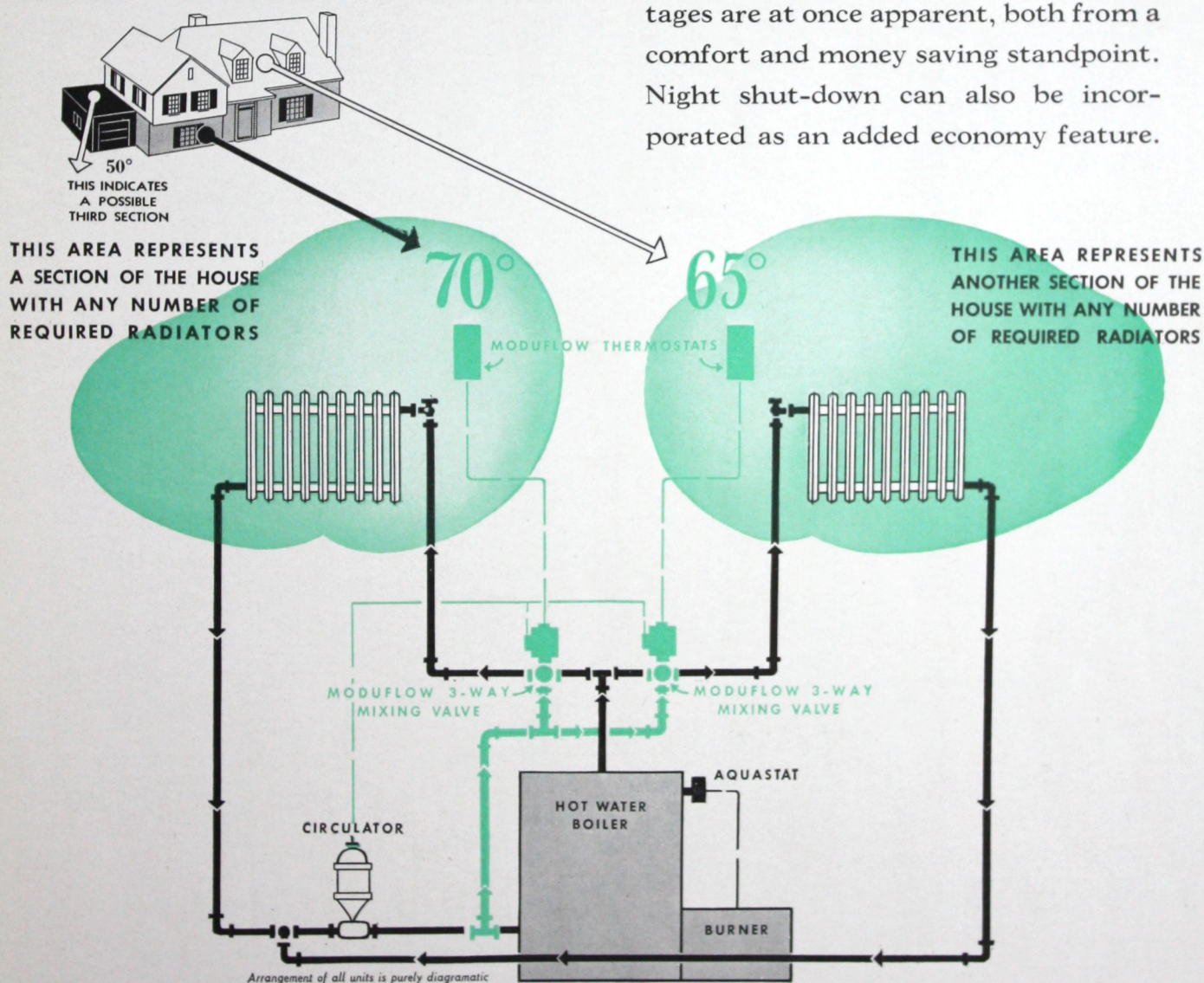
tions, depending on its size. This diagram shows only two sections, but the principle for more is exactly the same. The average home has three natural divisions — (1) Service section (kitchen, laundry, etc.) — (2) Living room—dining room section, and—(3) a Sleeping section. The heat requirements of the three are distinctly different. No need to go into the details of why they are different, for they are so apparent to all of us.

¶ The next step is to provide each section with the necessary MODUFLOW controls, which will maintain, automatically predetermined levels of heat for that section. Therefore, you can have one section cooler, while the other section is warmer, and reverse the order any time you desire, and the heat you save in one section can be utilized in the other. This results in a definite fuel economy.

¶ Let's follow the diagram on the opposite page. The green lines show the simple additions to your hot water heating system. All we did was to re-

place a conventional thermostat with a MODUFLOW-modulating thermostat, added a MODUFLOW 3-way mixing valve, and a short pipe line called a "bypass line", for each section. This is how it works. In each section the Moduflow supersensitive thermostat calls for heat. It sends an electrical message to the 3-way mixing valve, which opens its gates to admit hot water, the cooler return water from the radiators, or a combination of both—mixing it to the exact

needed temperatures before it goes to the radiators. But keep in mind the circulation of water is continuous, unless there is no demand for heat, in which case switches on the 3-way valves will shut off the circulator and burner. Also remember the water in the boiler is maintained at a constant temperature, providing a constant reservoir of heat. With sectional control, each section in the house appears to have its own heating system, and the advantages are at once apparent, both from a comfort and money saving standpoint. Night shut-down can also be incorporated as an added economy feature.



CONVENTIONAL WARM AIR SYSTEM

If your present heating system is warm air, it is probably made up of these essential elements — (1) furnace — (2) burner (coal, gas, oil) — (3) fan — (4) conventional thermostat — (5) Airstat (safety control) — and (6) Furnacestat (fan control). The functions of (5) and (6) are usually furnished in a single combination control unit.

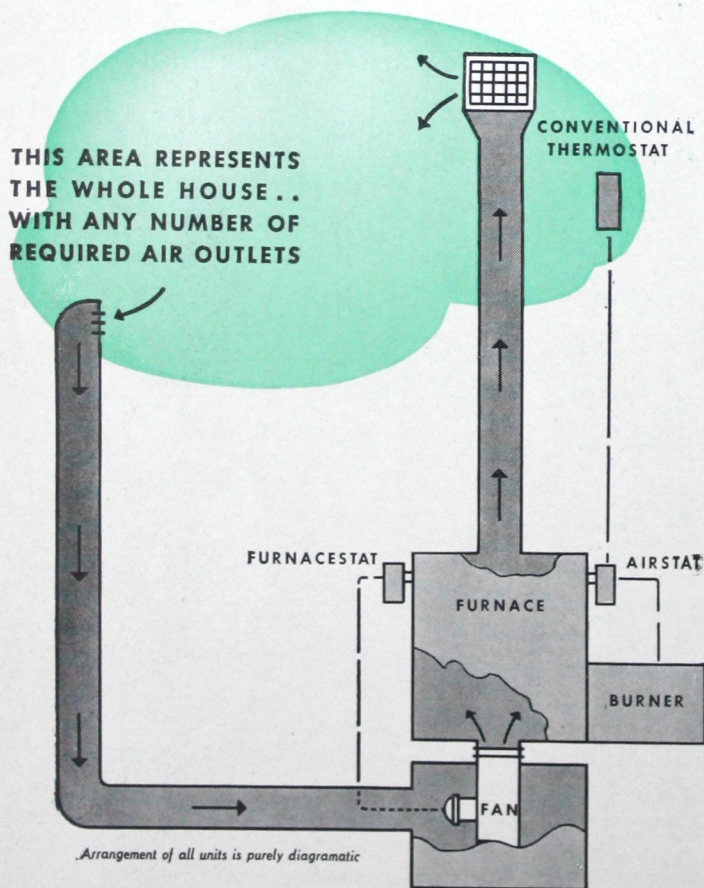
¶ Its operation is briefly this: When heat is required the thermostat sends an electrical message to the burner to “go on.” The warm air it has generated

is then forced by the fan through the ducts, and out the registers into the rooms of the house. The colder air is forced back to the return air registers, and starts its “merry go round” route all over again. When the room temperature has satisfied the thermostat it sends another message to the burner to “shut off.” Again we have what is known as the on-off intermittent type of heat distribution, with the system supplying either very warm air or no air.

¶ To prevent excessive temperatures in the furnace, the Airstat (safety control) stands by to shut off the burner, and takes precedence over the room thermostat. To prevent cold air circulating through the house, the Furnacestat starts the fan only when the temperature in the furnace is warm enough to send heat into the house, and continues to send heat as long as there is a heat supply in the furnace.

¶ The on-off operations inherent in this type of system, with all its disadvantages, are much the same as described under the conventional hot water system.

¶ The MODUFLOW SYSTEM of control will correct this.



MODUFLOW CONTROL SYSTEM FOR WARM AIR

¶ How can MODUFLOW be applied to your warm air heating system? One method of MODUFLOW application is shown on this page.

¶ The green lines are the simple additions, and all we did was to replace the conventional thermostat with a Moduflow Thermostat, added a Reset Panel and a temperature sensitive bulb, located in a warm air supply duct, near, but not too close to the furnace.

¶ Here is how it works. Follow the diagram, shown below.

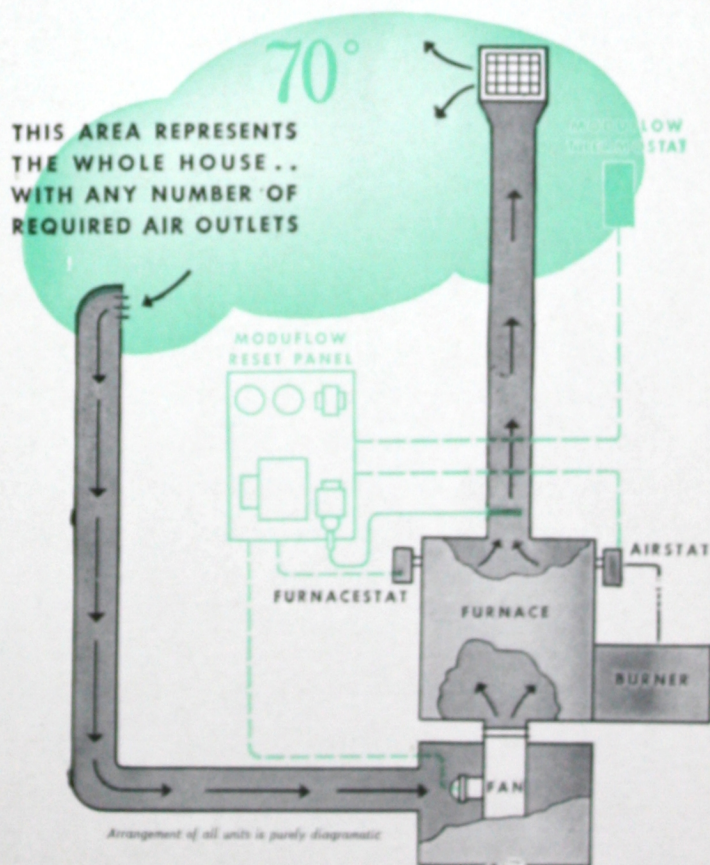
¶ The thermostat measures the rate of heat loss in the room, which is continuous, and sends an electrical message to the Reset Panel. The bulb, which is sensitive to the temperatures in the warm air supply duct, also sends a message to the Reset Panel. Then the Reset Panel goes to work. Upon receipt of the two messages, the panel immediately establishes the amount of heat which is to be delivered to the home for comfort. Comfort is of course predetermined by the occupants, through their original setting of the Thermostat. In other words, the Reset Panel is the "mastermind" that controls the burner, the fan, and the temperature of the air to be delivered to the room to create the comfort desired.

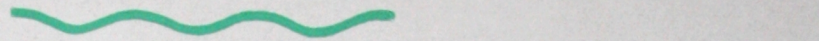
¶ More simply stated, this means that the Moduflow Reset method will deliver air to the registers at varying

temperatures, ranging from very hot to barely warm, and most important, air of the right temperature is always circulating. That's what you want.


¶ On the other hand, in mild weather when there is no demand for heat, a switch in the Reset Panel shuts off the burner and the fan, and the whole system is dormant. Night shut-down can also be incorporated as an added economy feature.

The illustration below shows only one method for installing Moduflow. There are others.





MODUFLOW SECTIONAL



CONTROL SYSTEM FOR WARM AIR

In discussing this subject, let us remind you again that if you are planning a postwar home, with a warm air heating system, consult your architect or contractor for the proper type of equipment to provide the advantages of continuous heat distribution. The diagram, on the opposite page, shows one method which is applicable to some types of furnaces. There are so many variations in warm air heating systems that it is impossible to diagram all in this booklet. This particular type of MODUFLOW SYSTEM may be applied to some furnaces—others may require different treatment to accomplish Moduflow Sectional Control.

¶ Much that has already been said will be repeated here, in the event that your preference is warm air heat, and you have hurriedly skipped over the previous discussions. However, this book is written without bias for any fuel or any type of heating system, for Minneapolis-Honeywell proudly serves the entire Heating Industry.

¶ What do we mean by Sectional? It is a method of distributing heat to the various parts of the house, in such a way that each part is warmed in accordance with its individual needs.

This is a new concept, and is in contrast to the current practice of trying to heat the entire house with one thermostat on one wall of one room at a uniform setting. Furthermore, it is in successful use today in most modern public and commercial buildings, and the principle is now to be applied to homes at a very reasonable cost.

¶ By Sectional we mean to divide the house into its natural divisions. There can be 2, 3 or more sections, depending on its size. A 3 way division might be—(1) the service section—(kitchen, laundry, recreation room) — (2) the living section — (living, dining, and study rooms)—(3) the sleeping section—(bedrooms, nursery, bath rooms). How you sectionalize is entirely up to you. The foregoing are only suggestions. The diagram on the following page shows only two sections, but the principle for more is exactly the same. In fact, it is the same as if the house were only one section, save for the addition of the necessary MODUFLOW controls.

¶ After you have determined the number of sections, then the next step is to provide each section with the necessary MODUFLOW controls, which will maintain automatically predeter-

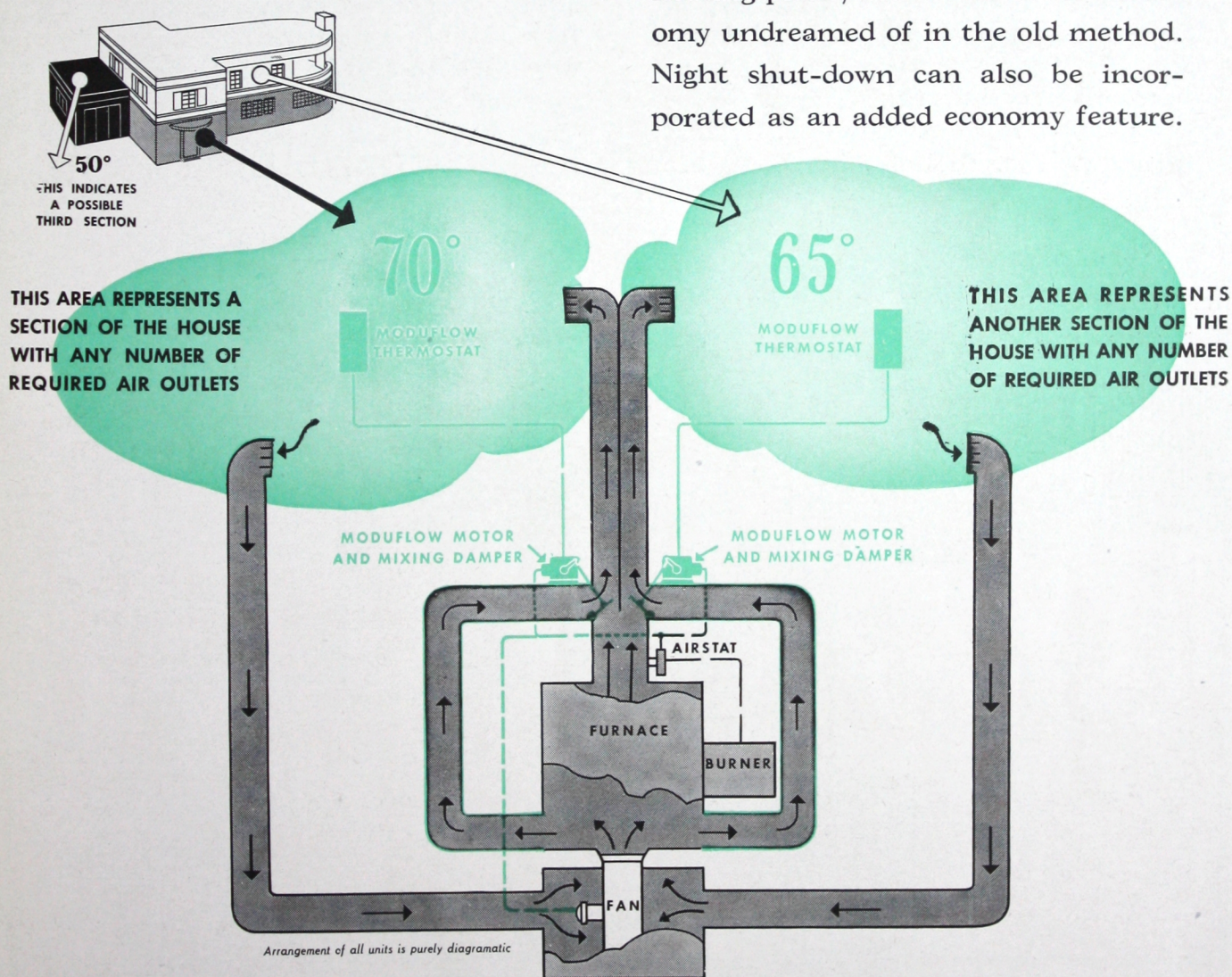
mined levels of heat for that section (see green portion of diagram).

¶ For a brief and simple understanding of how this MODUFLOW method works, let's follow the diagram below.

¶ The green lines are the simple additions, and all we did was to replace the conventional thermostat with a Moduflow-modulating thermostat, added a Moduflow damper motor and mixing damper, and a "by pass", for each section.

¶ In each section, the MODUFLOW supersensitive thermostat calls for heat. It sends an electrical message to the Moduflow damper motor, which operates the mixing damper. This damper mixes the air, taking the warm air from the furnace, the cooler return air, or a combination of both, to create the right temperature to be delivered to the registers.

¶ With sectional control, each section in the house appears to have its own heating plant, with comfort and economy undreamed of in the old method. Night shut-down can also be incorporated as an added economy feature.



CONVENTIONAL STEAM SYSTEM

In the average existing home heated by steam, the operation is something like this (see diagram lower left). The thermostat stops and starts the automatic burner, in conjunction with a safety control called a "Pressuretrol," which limits the steam pressure in the boiler. Steam is delivered to the radiators as

required to satisfy the conventional room thermostat, resulting in the same "on and off" system of heat distribution as described in the hot water and warm air systems. This, as said before, is not satisfactory in the light of what we know today. The MODUFLOW system of control can correct that.

MODUFLOW CONTROL SYSTEM FOR STEAM

To convert your existing steam system to MODUFLOW is relatively simple (see diagram lower right). The green lines show the additions—namely, the substitution of a MODUFLOW thermostat for the conventional one now in use, and a modulating steam valve for the present valve in your line. Orifices (discs with small holes in them) are

placed at the intake connection of each radiator to equalize the distribution of steam so each gets its proper share, and when these three things have been accomplished, you have the new MODUFLOW Control System for postwar steam heating comfort . . . The modulating thermostat controls the MODUFLOW steam valve, which

THIS AREA REPRESENTS
THE WHOLE HOUSE..
WITH ANY NUMBER OF
REQUIRED RADIATORS

CONVENTIONAL
THERMOSTAT

PRESSURETROL

STEAM
BOILER

BURNER

Arrangement of all units is purely diagramatic

THIS AREA REPRESENTS
THE WHOLE HOUSE..
WITH ANY NUMBER OF
REQUIRED RADIATORS

MODUFLOW
THERMOSTAT

70°

ORIFICE

MODUFLOW STEAM VALVE

PRESSURETROL

STEAM
BOILER

BURNER

Arrangement of all units is purely diagramatic

opens to let just the right amount of steam pass through to give the radiators the right amount of heat. The Pressuretrol, shown in black, controls the burner to maintain a pre-determined head of steam in the boiler. An auxiliary switch on the modulating

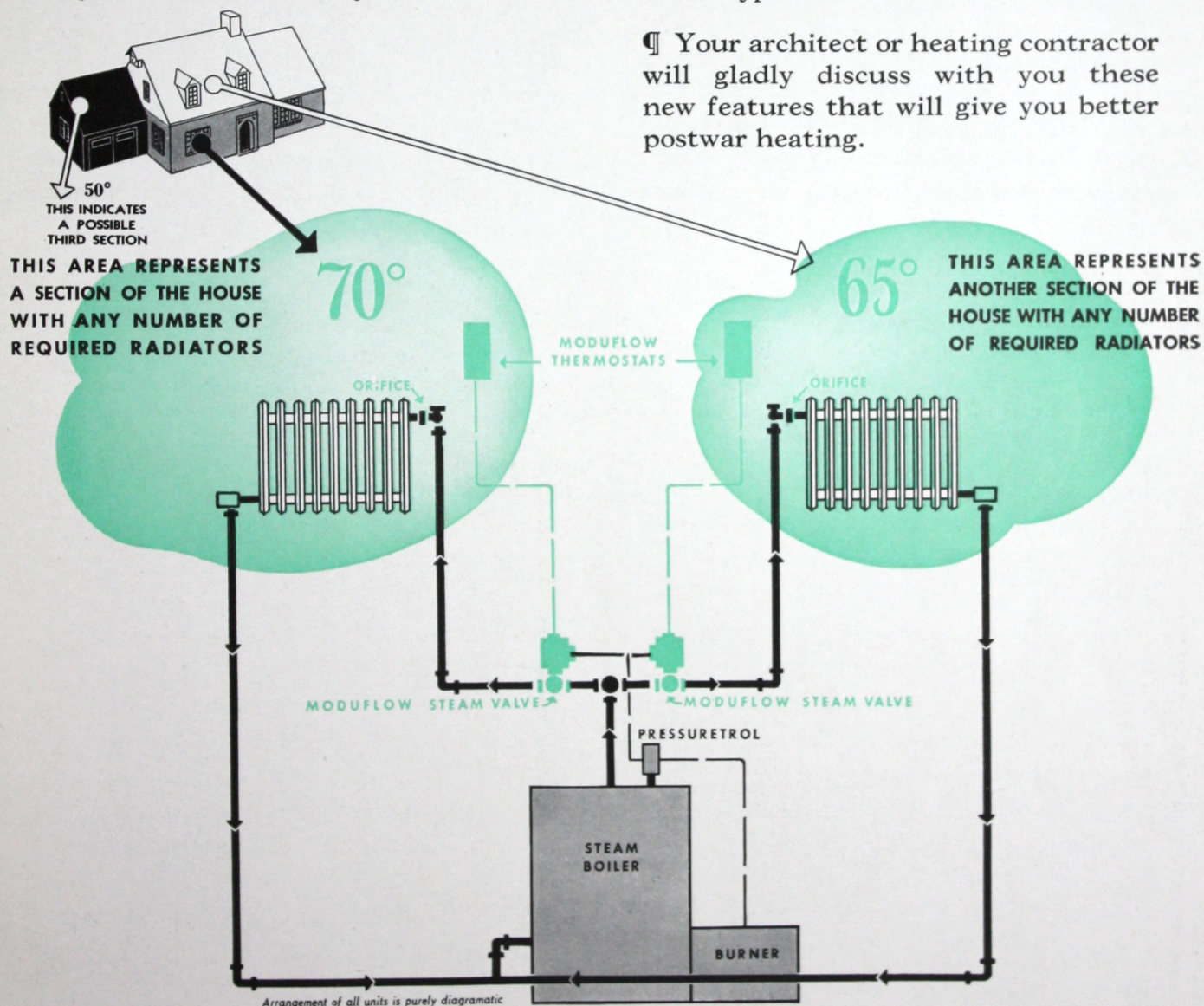
valve may be used to stop the burner whenever the valve reaches a closed position, indicating that comfort has been reached without further heat supply from the boiler. Night shut-down can also be incorporated as an added economy feature.

MODUFLOW SECTIONAL CONTROL FOR STEAM

The diagram below represents a two section home heated with steam — MODUFLOW added. (See green portion of diagram.) It is quite likely you will want three or more sections. That's the way our homes usually divide them—

selves. In any event the application is just as simple as in a single section home — the advantages to be gained exactly the same — and just as readily obtainable with steam as with any other type of heat.

¶ Your architect or heating contractor will gladly discuss with you these new features that will give you better postwar heating.



AIR CONDITIONING

Air conditioning systems in general use today in homes resemble in some details the warm air systems with ducts and air outlets. The application of MODUFLOW to these systems is just as easy as any other — the advantages exactly the same. Perhaps a word here about air conditioning, which has been universally misunderstood by the public at large, is in order.

¶ Air conditioning divides itself in two distinct applications—winter and summer. In the summer it cleans, cools, and removes moisture from the air that it sends through the house. In the

winter it cleans, heats, and adds moisture. In the case of winter conditioning the same warm air furnace will supply the warm air direct, or if a boiler is used, the hot water will be transferred to a heating coil, over which the air passes.

¶ For summer conditioning, cooling coils and some form of refrigeration are added, of which there are various types. The air conditioned home can also be sectionalized, as described elsewhere in this booklet, and MODUFLOW controls added to give the same big advantage.

COST — A VERY IMPORTANT MATTER

Yes, we all agree—Cost is an important part of all that has been said so far. We all have to manage our budgets and make our purchases as judiciously as possible. Sometimes we have to evaluate one desire against another, and sometimes we are not as wise in that respect as we could be. We also agree that home heating is of prime importance to our well being, health, and comfort, and that only the best is good enough. Strangely enough, the best is also the cheapest, for it lasts longer, performs better, with a minimum of upkeep, and at the same time

yields the biggest dividends in money saved through efficient use of fuel.

¶ Unfortunately, we must deal in generalities for this purpose. However, it might be fairly stated that the MODUFLOW SYSTEM of control as described in the foregoing pages, will cost no more than a good refrigerator Spread over the life of your home, it amounts to no more than a few cents a week. Of course . . . each additional section placed under control will cost about the same.

PERSONALIZED HEATING CONTROL FOR APARTMENTS

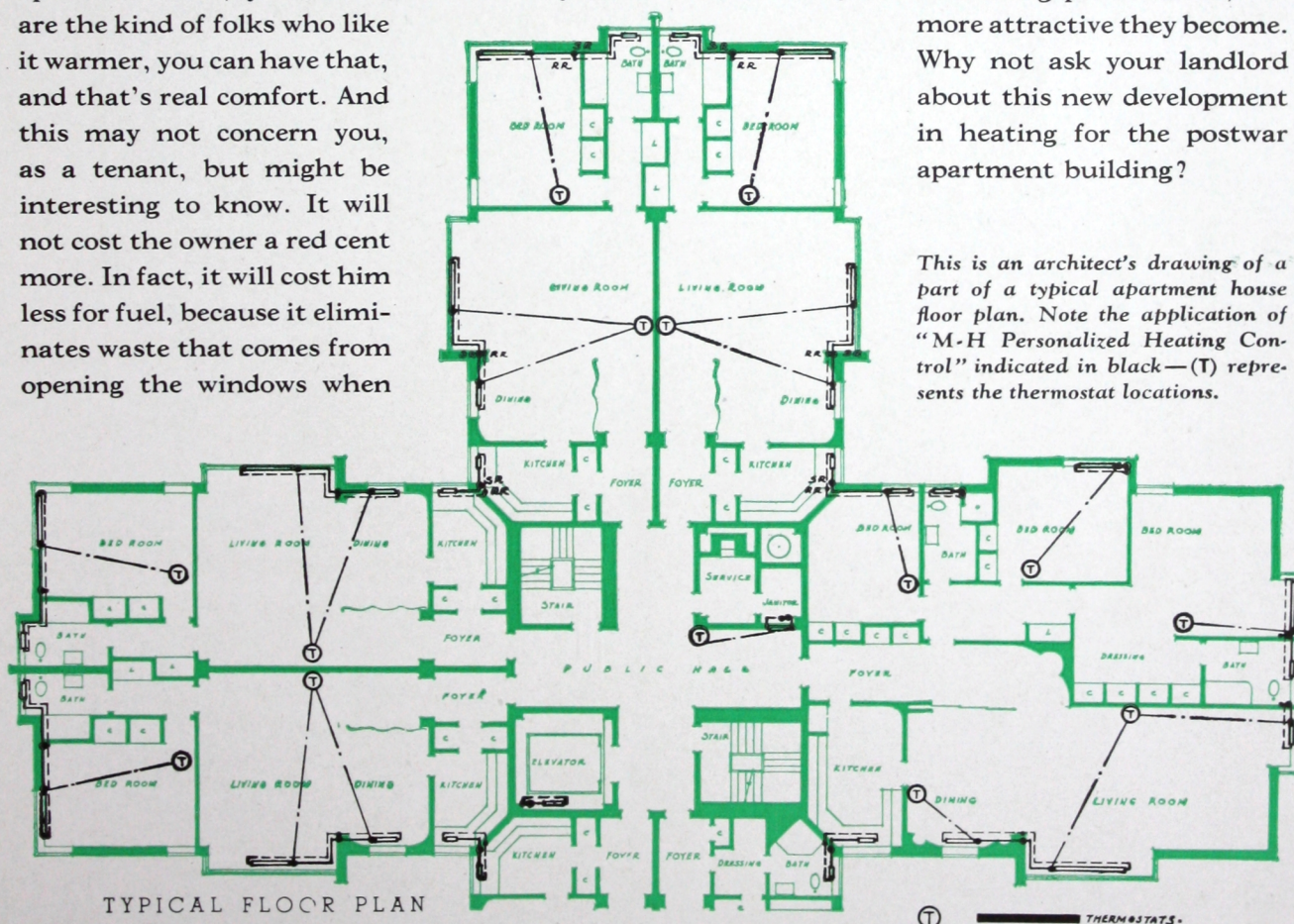
PERSONALIZED—a very interesting word—full of human interest because it identifies itself solely with ourselves. NOW, we are going to get personalized heating control for our apartments. Just as you select your own furniture, rugs, drapes, and knick-knacks to express your own personality in your home, so you can select the right temperature to satisfy your own personal comfort. No longer will you have to be governed by your neighbors' desires in heating comfort, or that of the fireman or janitor. If you like your apartment cool, you can have that. If you are the kind of folks who like it warmer, you can have that, and that's real comfort. And this may not concern you, as a tenant, but might be interesting to know. It will not cost the owner a red cent more. In fact, it will cost him less for fuel, because it eliminates waste that comes from opening the windows when

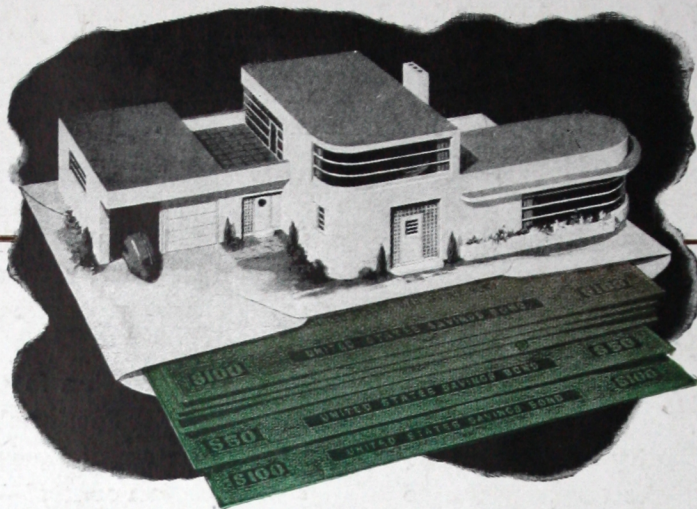
it's too hot for comfort, and it will make his apartments easier to rent. There are other savings, too, which we will not mention here.

¶ The application is the same as that described under Sectional Control with MODU-FLOW. In small apartments you can have single section control—in the larger, you can have the service, living, and sleeping portions controlled—the same as in a fine, single residence. After all, an apartment house is only a number of individual dwellings, and the nearer they come to being personalized, the more attractive they become.

Why not ask your landlord about this new development in heating for the postwar apartment building?

This is an architect's drawing of a part of a typical apartment house floor plan. Note the application of "M-H Personalized Heating Control" indicated in black—(T) represents the thermostat locations.





We hope you have found the booklet interesting and informative, and that because of it you not only know more about your present heating system, but will want to improve it with MODUFLOW. You can start right now to plan that new home, or to modernize your present one. In doing so, your first consideration should be quality — comfort heating in the modern manner.

BUY U. S. SAVINGS BONDS

MINNEAPOLIS HONEYWELL
REGULATOR COMPANY

Minneapolis, Minnesota

First printing—November 1943
Second printing—January 1944
Third printing—February 1944
Fourth printing—March 1944
Fifth printing—May 1944
** Sixth printing—November 1944*
Seventh printing—January 1945
Eighth printing—March 1945
Ninth printing—September 1945
Tenth printing—January 1946